

**Conference on Effectively Restoring Ecosystems
22-24 August 2000, St. Louis, Missouri**

BACKGROUND

Session: Breakout 2A

Topic: Case Studies – Salt Marshes

Moderator: George Hart, CENWS

Recorders : Don Becker, CENWD-MR

Panelists:

- Pat Cagney, CENWS
- Larry Oliver, CENAE
- Carolyn Murphy, CESWG
- Bill Porter, CESAJ

Objective: To identify characteristics of successful ecosystem restoration efforts and provide lessons learned.

Description: Four salt marsh restoration efforts that the Corps of Engineers has initiated or completed were presented, including: 1. Gulf Intracoastal Waterway Mitigation – Aransas National Wildlife Refuge, Texas; (2) Sagamore Marsh Restoration, Massachusetts; 3. Munyon Island Restoration, Florida; and (4) Deepwater Slough Restoration, Washington.

HIGHLIGHTS

**Gulf Intracoastal Waterway Mitigation, Aransas National Wildlife Refuge, Texas
Carolyn Murphy, CESWG (409-766-3044)**

Description: This is a Section 216 project intended to mitigate impacts from the Gulf Intracoastal waterway project to the Aransas National Wildlife Refuge. The impacts needed to be addressed since the critical habitat of the endangered whooping crane was being affected by vessel-induced wave erosion. Protection measures implemented included protection of 12.2 miles of shoreline and creation of 1614 acres of marshes through the use of dredge material. Concrete mats, vegetation plantings and geotubes were the measures used to provide the protection needed. It is anticipated that the restoration will be long term but biological monitoring is required and is being conducted by the NMFS. Funding for the \$20 million project was provided by the CE. O & M work is the responsibility of the Galveston District.

Key Issues: (1) Development of a design to provide sustainable protection from wave erosion (concrete mat instead of riprap; (2) Conduct of extensive coordination during design and construction to avoid impacts to numerous sensitive wildlife species; and (3) development of a hazardous materials spill plan, working with the U.S. Coast Guard and the Texas Dept. of Transportation.

Lessons learned: (1) Innovative protection designs were most cost-effective and show promise of providing long term solutions; and (2) an interagency coordination team (ICT) became a very useful tool in developing the project.

Sagamore Marsh Section 1135 Restoration, Cape Cod, Massachusetts
Larry Oliver, CENAE (978-318-8347)

Description: The purpose of this project was to restore a salt marsh along the Cape Cod Canal. The degradation problem was caused by alterations to the natural inlets to the salt marsh, negatively affecting marsh health, including estuarine productivity, species dominants and natural diversity. Key hydrological parameters adversely affected were depths, duration and extent of flooding. After problem identification and evaluation of alternatives, an inlet measure and channel measure were selected to restore a more natural hydrologic regime to 50 acres of the marsh. The inlet structure consisted of two 6 ft.X 6 ft. culverts with sluice gates for flood control, and a modified, widened channel. Prior to the design of these measures, it was necessary to monitor eelgrass stands in the existing (narrow) channel to insure that the tidal regime would not adversely affect these critical resources. Significant factors which forced and reduced the scale/size of the project included: (1) potential flooding/salinity impacts to adjacent land parcels containing wells and septic systems; (2) concerns about habitat of the 4-toed salamander, a state species of concern; and (3) the need to ensure proper drainage of the marsh peat. Because of the first concern, funding under the Section 1135 program was provided to the U.S. Geological Survey to evaluate the effects of the project on wells and septic systems. Additional monitoring will be conducted for a period of 5 years. Post-project monitoring of changes in the plant community, flooding levels, soil water salinity and the population of the four-toed salamander is also being conducted to ensure that these resources are not impacted. The project is under construction in FY 2000.

Key Issues: (1) Sizing of the channel and inlet were critical, so the UNET model and field calibration with biological information were required to develop appropriate extent and duration of flooding to provide the necessary salinity and water levels; and (2) a ground water study by USGS was necessary to address public concerns on project impacts to private septic systems and wells.

Lessons Learned: (1) Pre-design monitoring of eelgrass was necessary for two years in order to establish a baseline condition for planning purposes (2) Unexpected site constraints developed which reduced the size of the project.

Munyon Island, Section 1135 Restoration, Palm Beach County, Florida
Bill Porter, CESAJ (904-232-2259)

Description: Munyon Island is located within the Lake Worth Lagoon Estuary on the east coast of Florida. It is part of the John D. MacArthur Beach State Park. Originally only 15.5 acres, the island has grown to 45 acres due to placement of materials dredged from the Atlantic Intracoastal Waterway. However, extensive losses of wetland habitat had occurred on the island due to wave erosion and invasion of Australian pine. Initial

restoration work was conducted by the sponsor, Palm Beach County, but total site restoration requirements exceeded their capability. The CE restoration project under Section 1135 authority consisted of design of a sinuous inlet channel, regrading/excavation of the dredge fill to create wetland elevations, removal of stands of a nuisance species, Australian Pine, planting of cordgrass and mangrove vegetation, filling of an anoxic, dredged hole near the island, and construction of a breakwater on the wave or high energy side of the island next to the Intracoastal Waterway. The project was completed in 1997 at a total project cost of \$1.8 million. Crediting of local design work required early negotiation and execution of the PCA. Monitoring is being done by the sponsor.

Key Issues: (1) Shoreline protection required significant volumes of rip-rap placed in water, which increased project cost beyond what could be accomplished by the sponsor.

Lessons Learned: (1) Local design work was found to be adequate for project purposes, so it was used as part of the 25% local cost share; (2) Construction of the channel and site restoration (including vegetation planting) performed by the sponsor was valuable in that it greatly reduced the amount of cash required for the project. The locals did not request or receive credit for LERRD's.

**Deepwater Slough Section 1135 Restoration
S. Fork, Skagit River Delta, Washington
Pat Cagney, CENWS (206-764-6577)**

Description: At the project site, past agricultural and other activities had greatly affected fish and wildlife and other natural resources (an island within the river delta). An extensive system of agricultural levees, constructed by various interests over many years, had greatly altered site hydrology, including fresh and tidal sources. The project objective was to restore historical hydrology to the extent practicable, provide channel and slackwater habitat for 5 species of salmonoids, and provide wetland habitat for aquatic birds and other wetland wildlife. A constraint to planning included existing use of the area by migrating waterfowl and need to maintain recreational hunting. Measures used to restore about 500 acres of habitat included: (1) construction of new levees to provide surface impoundments; (2) opening of old aquatic areas by breaching/removal of old levees; (3) construction of new channels; and (4) selective wetland plantings. Extensive collaboration with several Indian tribes, the State Department of Fish and Game, and state National Guard helped ensure a successful project. Completed in 1999, a 5-year monitoring effort is now underway.

Key Issues: (1) Restoration was expensive because all equipment had to be barged to the island; and (2) extensive coordination was required to insure that existing fish and waterfowl resources and values were not impacted.

Lessons Learned: (1) The project could not have been built without the extensive collaboration of all interests involved; (2) It was discovered that a military agency could be used in a cost-effective way through utilization of their demolition expertise in

creating breached areas in existing dikes; and (3) a contractor's expertise was critical in developing a conveyer system to move rock from a barge to the new dike structure. This resulted in considerable project savings.